falling at the horary rate of twenty-five for one observer, but my outlook was somewhat limited by obstructions.

After $15^h\ 45^m$ the fog increased and further observations could not be made.

The radiant of the Leonids was at $151° + 23°$. The meteors seemed apparently less bright than those forming the shower of 1903 November 15. The minor radiants of the period were unusually active, and the two most prominent of these were at $43° + 21°$ and $143° + 37°$.

I could not assure myself that the shower was increasing in intensity during my intermittent watch, but from several reports sent in by reliable observers it appears that the maximum occurred at about 16^h, or soon after that hour, when the rate of apparition reached one Leonid per minute. This would make the display somewhat richer than an ordinary Perseid shower and about one-fourth as strong as the Leonid return of 1903 November 15.

There were, however, a considerable number of brilliant Leonids recorded by various observers between 17^h and $17^h\ 17^m$, and I have received descriptions of twelve different meteors, equal to or exceeding first magnitude, which appeared during the short interval mentioned.

On November 15 at $14^h\ 40^m$ a magnificent meteor was seen at Charmouth and Torquay (where the observers estimated it as equal to the Full Moon and four times brighter than *Venus* respectively), and it appears to have been directed from a radiant in *Aries* and to have descended from eighty-three to thirty miles along a path of eighty-two miles over the north coast of France.

The fire ball lit up the sky vividly and must have presented a splendid effect over the English Channel.

Bishopston, Bristol:
1904 *December* 7.

A Comparison of the A. G. Catalogue (1900·0) *for Vienna* (*Ottakring*) *with the Radcliffe Third Catalogue* (1890·0). By F. A. Bellamy, M.A.

1. The publication of vol. ii. of the second or southern series of zone catalogues of the *Astronomische Gesellschaft* affords an opportunity of comparing this differential catalogue of stars with absolute places such as are given in the Radcliffe Third Catalogue (1890·0). In this Radcliffe Catalogue special attention was paid to stars south of the equator, with a view to establish a connection with the Cape (1880) Catalogue. The Vienna zone extending from $-6°$ to $-10°$ thus falls entirely

within that region of the sky observed at the Radcliffe Observatory. Stars common to the two Catalogues are 967 in number, but, omitting fundamental stars, the number used is 923. The Radcliffe Catalogue, moreover, has a special interest for the writer, since he took a considerable share in the observations during his appointment at that observatory; and he was thus led to make the comparison briefly described in the present paper.

2. The observations for the A. G. zone were commenced on 1892 January 19, and finished on 1899 January 12; most of the observations were made during the years from 1893 to 1896. Some revision work was done after 1898. The instrument used was the Repsold meridian circle with an object-glass of 5·1 inches diameter and 5 feet focus, and 120 magnifying power. The observations were made at the Kuffner Observatory at Ottakring (Vienna).* The Radcliffe observations were made with the transit circle, which is almost identical in size and power: its description may be found in the Radcliffe volumes.

At Vienna the transits were chronographically recorded and the circle read by two microscopes 180° apart; the R.A.'s and Dec.'s in a zone usually depend upon the observations of four to six fundamental stars as given in Auwers's "Mittlere Oerter von 303 Sternen nach den definitiven Fundamental-Katalog für die südlichen Zonen der Astronomischen Gesellschaft für 1900·0."† But only forty-four stars, which fall within the Vienna zone, were used from that catalogue. The Radcliffe observations were made by the eye and ear method, and the Greenwich clock-star list was used.

3. The precessions and secular variations in the Vienna and Radcliffe Catalogues are those calculated from Struve's constants. The epoch of the Vienna Catalogue being 1900·0 (which will be the epoch for all the A. G. Southern Catalogues) and the Radcliffe 1890·0, it was first necessary to bring the positions of the 923 stars to a uniform epoch. In doing this no corrections were applied for P.M.'s; after applying them to about a hundred stars I found the effect in the mean was small, so decided to use the places uncorrected for proper motion.

Group of R.A.	Right Ascension. R−V.	Diff. from Wt. Mean.	Correction to Radcliffe (from Auwers).	Diff. from Mean Corrected.	Declination. R−V.	Diff. from Wt. Mean.	Correction to Radcliffe (from Auwers).	Diff. from Mean Corrected.	Number of Stars.
h h	s	s	s	s	″	″	″	″	
0–1	−0·068	−·044	+·015	−0·029	+0·99	+0·33	−0·01	+0·32	26
1–2	−·057	−·033	+·012	−·021	+·69	+·03	−·02	+·01	34
2–3	−·036	−·012	+·006	−·006	+·80	+·14	−·01	+·13	35
3–4	−·030	−·006	−·002	−·008	+·71	+·05	−·02	+·03	26
4–5	−·025	−·001	−·007	−·008	+·65	−·01	−·04	−·05	44

* See description of the instrument in *Publikationen der von Kuffner'schen Sternwarte*, Band I.

† *Berliner Astronomisches Jahrbuch*, 1901, Anhang II. p. [9].

Group of R.A.	Right Ascension. R−V.	Diff. from Wt. Mean.	Correction to Radcliffe (from Auwers).	Diff. from Mean Corrected.	Declination. R−V.	Diff. from Wt. Mean.	Correction to Radcliffe (from Auwers).	Diff. from Mean Corrected.	Number of Stars.
h h	s	s	s	s	"	"	"	"	
5– 6	·000	+·024	−·008	+·016	+·56	−·10	−·06	−·16	47
6– 7	−·022	+·002	−·007	−·005	+·74	+·08	−·06	+·02	48
7– 8	−·016	+·008	−·006	+·002	+·53	−·13	−·04	−·17	40
8– 9	−·014	+·010	−·003	+·007	+·53	−·13	−·03	−·16	43
9–10	−·038	−·014	·000	−·014	+·45	−·21	−·05	−·26	40
10–11	−·008	+·016	−·001	+·015	+·38	−·28	−·08	−·36	29
11–12	−·028	−·004	−·008	−·012	+·77	+·11	−·09	+·02	41
12–13	+·005	+·029	−·012	+·017	+·79	+·13	−·10	+·03	36
13–14	−·016	+·008	−·012	−·004	+·68	+·02	−·11	−·09	44
14–15	+·011	+·035	−·011	+·024	+·89	+·23	−·13	+·10	38
15–16	−·004	+·020	−·009	+·011	+1·04	+·38	−·15	+·23	31
16–17	−·001	+·023	−·006	+·017	+0·92	+·26	−·15	+·11	40
17–18	−·015	+·009	−·003	+·006	+·74	+·08	−·13	−·05	37
18–19	−·037	−·013	−·002	−·015	+·40	−·26	−·11	−·37	50
19–20	−·030	−·006	·000	−·006	+·47	−·19	−·06	−·25	47
20–21	−·039	−·015	+·002	−·013	+·61	−·05	−·03	−·08	40
21–22	−·035	−·011	+·006	−·005	+·39	−·27	·00	−·27	41
22–23	−·039	−·015	+·011	−·004	+·72	+·06	+·01	+·07	31
23– 0	−·035	−·011	+·016	+·005	+·75	+·09	·00	+·09	35
Weighted Means	−0s·024				+0″·66				923

4. In the table I have collected the mean differences for each hour of right ascension. With regard to the mean differences −0s·024 in R.A. and +0″·66 in Dec., these are in great part due to the Radcliffe Catalogue. In *Monthly Notices*, vol. lv. p. 295, Mr. E. J. Stone deduced for the mean differences between Radcliffe (1890) and Greenwich (1880) for stars within the limits of −5° and −10° declination the values

$$\Delta\alpha(\mathrm{R}-\mathrm{G}) = -0^{s}\cdot017, \quad \text{and} \quad \Delta\delta = +0''\cdot91\ ;$$

and the systematic differences V−G would thus be

$$\Delta\alpha(\mathrm{V}-\mathrm{G}) = -0^{s}\cdot007, \quad \text{and} \quad \Delta\delta = -0''\cdot25.$$

But the differences in R.A. for the separate hours, which range from −0s·068 to +s·011, are greater than might be expected, considering the number of stars compared; the greatest negative quantity is −0s·057. If we subtract from the results for each hour the mean value of the whole, we get quantities under "difference from mean." The mean of these, without regard to

sign, is $\pm 0^s\cdot015$; a glance at the residuals (third column) shows that the residuals are systematically positive from 5^h to 18^h, while those for 18^h to 5^h are negative. The means of the two groups are :

$$\left.\begin{array}{ll} \text{h} \quad \text{h} & \text{s} \\ 5-18 & \Delta\alpha = +0\cdot013 \\ 18-\ 5 & \Delta\alpha = -0\cdot015 \end{array}\right\} \text{ Difference, } 0^s\cdot028.$$

Apparently there are systematic differences in declination, but they are not so prominent.

5. Since the Vienna observations are based on Auwers's system these differences should be mainly due to the Radcliffe Catalogue. The corrections required by Radcliffe to reduce to Auwers's system have been recently published * and are reproduced in columns 4 and 8 in the table. Inspection shows that if the differences R—V are entirely due to Radcliffe, Auwers's corrections should be approximately doubled. Thus the mean corrections given by Auwers for

$$\left.\begin{array}{lll} \text{h} \quad \text{h} & & \text{s} \\ 5-18 & \text{are } \Delta\alpha = & -0\cdot007 \\ 18-\ 5 & \text{,, } \Delta\alpha = & +0\cdot005 \end{array}\right\} \text{ Difference, } 0^s\cdot012.$$

The reason of this discrepancy is probably as follows : the Radcliffe Catalogue is known to be affected with sensible errors, depending on declination, as is apparent from Mr. Stone's paper (*Monthly Notices*, vol. lv. p. 295), and from that of Dr. Auwers on p. 34 of the work quoted. The comparison with Vienna is confined to a particular zone, $-6°$ to $-10°$, while Auwers's comparison applies to all stars south of $+50°$. Hence this seems to be a case where the systematic corrections cannot be arranged in two independent series, one varying with R.A. and another with Decl., as Auwers suggests. There should be a different set of R.A. corrections for each zone of Decl. The results given by Mr. Stone for groups of 6^h (*Monthly Notices*, vol. lv. pp. 296–7) support this conclusion.

6. But the following points were briefly examined : (*a*) *Possible Magnitude Equation.*—The Vienna observations are affected, according to Dr. L. de Ball, with an equation of $0^s\cdot0025$ per magnitude, and the Radcliffe observations are probably also affected to some extent. It was soon seen that the joint effect on the comparison in R.A. could not be sensible, for on taking means of groups the mean magnitudes were all within 0·4 of the mean magnitude of the whole (7·3). (*b*) The mean declination of the groups does show a curious tendency to systematic difference, the mean for 6^h-18^h being $8°\cdot15$, and for 18^h-6^h it is $7°\cdot87$, a difference of $0°\cdot27$; but this can scarcely be responsible for any large portion of the observed differences.

* *Astronomische Abhandlungen als Ergänzungshefte zu den Ast. Nach.* Nr. 7. Kiel, 1904.

DETACHED NEBULA IN CYGNUS
Photographed by W. S. Franks.

7. In the introduction to the Greenwich Second Ten-year Catalogue for 1890 a comparison is given for ten A. G. Catalogues. In a similar manner I have determined the mean differences $\Delta\alpha$ and $\Delta\delta$ from the 138 stars in Vienna and Greenwich Catalogues and for the thirty-six fundamental stars (Auwers). Proper motions have been applied. The following are the results :

	$\Delta\alpha$.	$\Delta\delta$.		$\Delta\alpha$.	$\Delta\delta$.	
$-6°$ to $-10°$	$-0^s\cdot01$	$-0''\cdot2$	138 stars ;	$-0^s\cdot014$	$-0''\cdot36$	36 stars.

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Detached Nebula in Cygnus. By W. S. Franks.

I was much interested in Dr. Max Wolf's paper on the remarkable nebula in *Cygnus* (*Monthly Notices*, vol. lxiv. p. 838), and thought it worth while to try it with the 20-inch reflector of this observatory. The accompanying photograph was obtained on 1904 November 12, with ninety minutes' exposure, between $21^h\ 36^m$ and $23^h\ 6^m$ local sidereal time ; sky clear, but partial moonlight (Moon five days old). Another photograph was obtained simultaneously with the 5-inch camera, but, as it corroborates Max Wolf's in every respect, it is not necessary to reproduce it also. The scale adopted is $1^{mm} = 30''$ of arc ; the extent of field shown is $1°\ 22'$ from p to f and $57'$ from n to s, the centre of plate being roughly in R.A. $21^h\ 49^m\cdot6$, Decl. $+46°\ 48'$ (1900). [The scale of Max Wolf's picture does not quite conform to the description, being only one-third instead of one-half of the present one ; 1^{mm} on that is therefore equal to about $90''$, not $60''$.] Owing to the superior defining power of the reflector the detail is here more clearly shown than on the former plate, though the exposure was only ninety minutes as against four hours. Although it bears a family likeness to the "trifid" nebula in *Sagittarius* it is more complicated in structure ; and, situated as it is in such a remarkably void region, it becomes a very interesting object. I have often noticed the curious thinning out of stars in the immediate vicinity of nebulæ, and undoubtedly there must be some physical cause to account for the fact, of which Sir W. Herschel was well aware. Is it possible that some of these objects are surrounded by *dark* and relatively cool nebulous matter, which, viewed in its greatest darkness round the edge, is sufficient to absorb and obliterate small stars behind it ? We have no ground for assuming that the nebulæ generally are more distant than the stars ; indeed, from their vast apparent size they may be much nearer. Considering, too, how few of the stars show any sensible parallax it may be that some of the nebulæ, when they are seriously attacked,